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阔叶苔草的花茎观察——兼论“茎侧生”这一术语在苔草分类中的意义

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关键词　阔叶苔草；侧生茎；假侧生茎；中生茎

阔叶苔草*Carex siderosticta* Hance 为东亚特产，分布于我国黑龙江、辽宁、吉林、河北、山西、陕西、河南、山东、浙江、江西诸省，以及日本、朝鲜和苏联远东地区。在北京，生长于附近山区（如百花山、东灵山、雾灵山、小五台山等），海拔1200—1700m 的落叶阔叶林下。其外形十分特异，非但其营养苗上具有很宽的叶片（宽可达 3 cm），并从横长的根状茎上抽出花茎；花茎无叶，仅基部具管状叶鞘，一般远离营养苗，这种花茎被描述为“茎侧生”（图 1）。它的奇异外貌，正如Raymond(1959)[1]所说，足使苔草植物的专家，惊叹不已。由于它的奇异，我们细心观察了它的生长情况，尤其是它的花茎生长情况。兹将我们观察结果简要描述如下。

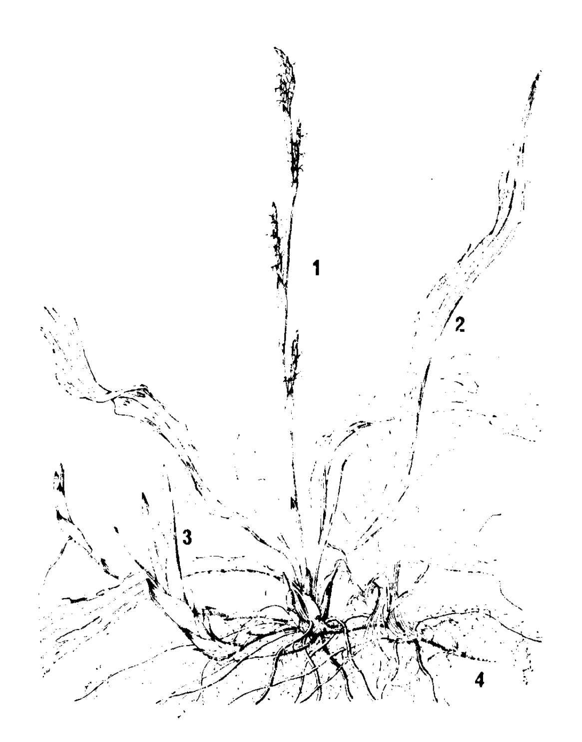


图 1　阔叶苔草Carex siderosticta Hance，示今年花茎从去年枯死叶簇中生出。1.今年花茎；2.去年枯死叶子；3.今年刚开始萌发的营养苗；4.根状茎。（冀朝祯绘）

Fig. 1. *Carex siderosticta* Hance, showing flower-bearing stem from the midst of decayed leaves of vegetative shoot of the previous year; 1. flower-bearing stem of the current year; 2. a decayed leaf of the previous year. 3. just-sprouting vegetative shoot of the current year; 4. rhizome. (C. Z. Ji)

在北京地区，5 月初，大部分花茎从去年枯死的叶簇中抽出，少数花茎也可直接由根状茎抽出。几乎与此同时，根状茎上的芽也萌发成新的

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叶簇，每一个叶簇即是一个营养苗。这些营养苗当年不生花茎，叶子也在冬季来临前枯死。花茎不具嫩叶，仅基部具管状叶鞘。这表明花茎是由去年营养苗的顶芽，经过一个冬季才发育而成，或根状茎上的芽直接发育而成。由于采集者在采集时，多将去年枯死的叶子除去，因此我们在标本室中所看到的标本，花茎均似从根状茎上生出。

讨 论

1.根据前人研究，苔草属植物的主轴（包括根状茎）有二类型，即合轴型和单轴型[2]。合轴型（sympodium）者如砂生苔草*Carex arenaria* L.（图2，图3），其根状茎由逐年的侧芽发育而成，侧芽可不断地保持生命力，顶芽发育成生殖苗或营养

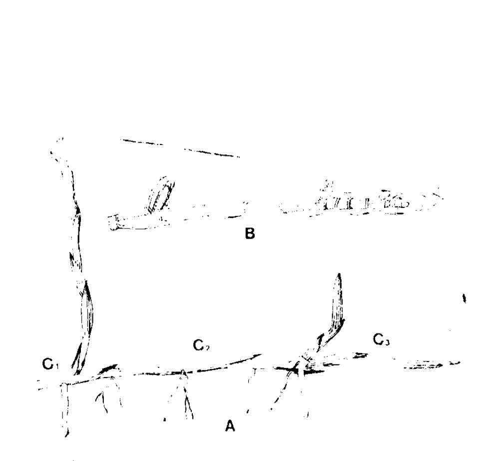


图2 砂生苔草 Carex arenaria L. 的根状茎。A. 示由三个侧芽发育而成合轴的根状茎（C_1—C_3）；B. 即A的示意图（根据谢列勃辽柯夫）

Fig. 2. Rhizome of *Carex arenaria* L. A. showing a portion of sympodial rhizome (C_1—C_3) developed from three successive lateral buds; B. diagram of A. (from И. Г. Серебряков)

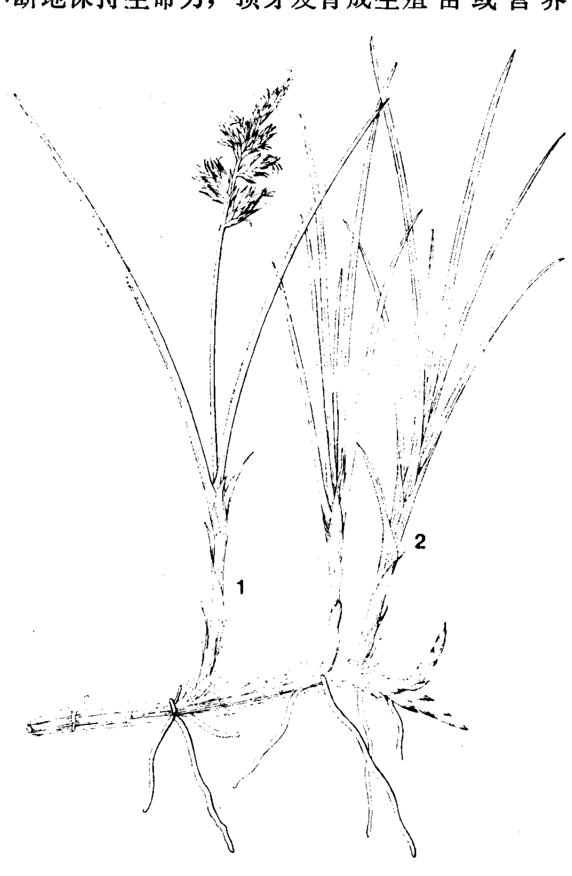


图3 砂生苔草 Carex arenaria L.示中生的花茎；1.由顶芽发育而成的生殖苗；2.由顶芽发育而成的营养苗。（根据 Kükenthal）.

Fig. 3. *Carex arenaria* L., showing central stem. 1. flowering shoot developed from apical bud; 2. vegetative shoot developed fron apical bud.(from Kükenthal)

苗。大多数苔草植物属于这一类型。若根状茎伸长者，则植株成散生；若根状茎缩短者，则植株为丛生。单轴型（monopodium）的主轴由逐年的顶芽发育而成，顶芽可不断地保持生命力。侧芽发育成花茎，当年死去。如：指状苔草 *Carex digitata* L.（图4）和西藏苔草 *Carex tibetica* Franch.（图5）。在一个丛生的植株中，可见到由顶芽发育而成的嫩叶，以及从老叶的叶腋中抽出的花茎。



图4　指状苔草 Carex digitata L. 示主轴为单轴型。1.今年的花茎，由去年叶子的叶腋中生出；2.去年的叶子；3.由顶芽萌发而生出的今年嫩叶。（根据谢列勃辽柯夫）

Fig. 4. *Carex digitata* L., showing monopodial type. 1. a flower-bearing stem of the current year, arising from the axil of leaf of the previous year; 2. a leaf of the previous year; 3. leaves of the current year developed from apical bud. (from И. Г. Серебряков)

2.阔叶苔草与砂生苔草相似，同属于合轴型，其花茎均由顶芽发育而成。所不同的，阔叶苔草的花茎，大部分是由去年营养苗的顶芽，经过一个冬天才发育而成，少部分由根状茎上的芽直接发育而成。砂生苔草的花茎是由当年生殖苗中抽出，其顶芽不需要经过冬天，即能发育成花茎。

3.指状苔草和西藏苔草属于单轴型，其花茎均由侧芽发育而成。

4.在苔草属分类中，对茎的生长方式的描述有二态（state），即"茎中生"（stem central）和"茎侧生"（stem lateal），这里的"茎"，是指花茎而言。所谓"茎中生"，指花茎具叶，叶子通常集中于花茎基部。"茎侧生"，指花茎仅仅具有一些无叶片的叶鞘，或生很短叶片的叶鞘，它们由根状茎生出或者从叶腋中生出[3]。在苔草的专著和一般苔草的志书中，阔叶苔草、西藏苔草和指状苔草的花茎均被描述为"茎侧生"[5,6,1]。已于上述，阔叶苔草的花茎，无论从枯死的叶簇中生出或从根状茎上生出，均由顶芽发育而成。而西藏苔草和指状苔草的花茎均由侧芽发育而成。在这里，"茎侧生"这一术语在科学意义上就不确切了，它可来源于两种不同性质的芽，顶芽或侧芽。由此可见，它们的相似性是由于趋同进化（convergent evolution）的结果，如同蘘科植物花的唇瓣和兰科植物花的唇瓣，在外形上很相似，但其来源不同（Dahlgren, Clifford and Yeo 1985）。



图5　西藏苔草 Carex tibetica Franch. 示主轴为单轴型。1.今年的花茎，由去年叶子的叶腋中生出；2.去年的叶子；3.由顶芽萌发而生出的今年嫩叶。（冀朝祯绘）

Fig. 5. *Carex tibetica* Franch., showing sympodial type. 1. a flower-bearing stem of the current year, arising from the axil of leaf of the previous year; 2. a leaf of the previous year; 3. leaves of the current year developed from apical bud. (C. Z. Ji)

5.鉴于在同一属中，用同一术语（茎侧生）来指示来源不同的器官，在科学上会产生混淆不清，在分类上也不宜把它们进行等同比较。因此，我们建议术语“茎侧生”只限于由侧芽发育而成的，如指状苔草和西藏苔草的花茎。阔叶苔草的花茎，虽外形似前二种，但实则上由顶芽发育而成，我们建议采用“假侧生”（stem pseudo-lateral）这一术语，以别前者。这样，在苔草中，茎的生长方式有三态（state）即“中生”、“侧生”和“假侧生”。

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ON CAREX SIDEROSTICTA WITH SPECIAL REFERENCE TO THE TERM "STEM LATERAL" IN CARICOLOGY

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Abstract *Carex siderosticta* Hance is a most spectacular member of the genus *Carex*. Its lateral flower-bearing stems, sometimes distant from the vegetative shoots with broad leaves, are striking even to someone familiar with the great variability in the genus *Carex*. It is distributed in China (provinces: Heilongjiang, Liaoning, Jilin, Hebei, Shanxi, Shaanxi, Henan, Shandong, Zhejiang, Jiangxi), Japan, Korea and the Far East of USSR. In Beijing, the species is frequent in deciduous broad-leaved forests at 1200—1700 m above sea level. *Carex siderosticta* Hance, particularly its flower-bearing stems, were observed in the field. In early spring, early May in Beijing, the vegetative shoots and flower-bearing stems with infundibuliform sheaths sprout almost simultaneously (Fig. 1). Most flower-bearing stems arise from the midst of decayed leaves of vegetative shoots of the previous year. In addition, some emerge directly from long creeping rhizome. However, the vegetative shoots never produce flower-bearing stems in the current year. It seems that the apical bud of the vegetative shoots develop the flewer-bearing stems only after having passed the cold winter.

As we know, the branching systems are of two types in the genus *Carex*, sympodium and monopodium. Most species, such as *C. arenaria* L. (Figs. 2 and 3) are sympodial. *Carex digitata* L. (Fig. 4) and *C. tibetica* Franch.) (Fig. 5) are the two examples of monopodium. Evidently *C. siderosticta* Hance belong to the sympodial type. In Caricology the term "stem" refers to the flower-bearing stem, except for being stated otherwise. The term "stem central" means that the leaves are arranged around the flower-bearing stem (usually at the base), while the term "stem lateral" means that the leaves are on a vegetative shoot

and the flower-bearing stems arise separately from the rhizome and bear few bladeless sheaths or short bladed leaves or the flower-bearing stems are located in leaf axils. In the monographies and some Floras of the genus *Carex* (Kükenthal 1909, Ohwi 1936, Raymond 1959), the stems of *Carex siderosticta* Hance, *C. digitata* L. and *C. tibetica* Franch., are all described as "stems lateral". Here, the meaning of the term "stem lateral" is obviously confused. The flower-bearing stems of *C. siderosticta* Hance arise from apical buds and those of *C. digitata* L. and *C. tibetica* Franch. from lateral buds. The similarity of the flower-bearing stems of *C. siderosticta* Hance, *C. digitata* L. and *C. tibetica* Franch. are due to the convergent evolution. It means that the flower-bearing stems of *C. siderosticta* Hance and *C. digitata* L. are incomparable as a character for classification of the genus *Carex*. So we would suggest that the term "stem lateal" refers to the flower-bearing stems arising from lateral buds only, such as those of *C. digitata* L. and C. tibetica Franch. A new term "stem pseudo-lateral" is coined here for so-called lateral stems of *C. siderosticta* Hance. In fact, these lateral stems arise from apical buds. Thus the stem of the genus *Carex* are of three states, i. e. "stem central", "stem lateral" and "stem pseudo-lateral".

Key words *Carex siderosticta*; Stem lateral; Stem pseudo-lateral; Stem central